JOHANNES KEPLER UNIVERSITÄT LINZ

ANTRITTSVORLESUNG

Univ.-Prof. Dr. Andreas Schell
Institut für Halbleiter- und Festkörperphysik

Vor seiner Rufannahme in Linz war Andreas W. Schell von 2019 bis Jänner 2023 Professor an der Leibniz Universität Hannover sowie gleichzeitig Gruppenleiter der Arbeitsgruppe Quantentechnologie an der Physikalisch-Technischen Bundesanstalt. Er promovierte 2014 an der Humboldt-Universität zu Berlin mit einer Arbeit über Festkörper-Einzelphotonen-Emitter und arbeitete anschließend an der Kyoto University in Japan und am Institute of Photonic Sciences (ICFO) in Spanien. Von 2018 bis 2019 war er Leiter der Quantum Optical Technology Group am CEITEC in Brno, Tschechische Republik.
Zu seinen aktuellen Forschungsthemen gehören die Spektroskopie und Integration von Festkörper-Einzelphotonen-Emittern wie Defektzentren oder Molekülen, heiße Atomdämpfe, Nanofabrikation und das Einfangen von Nanopartikeln mit optischen Pinzetten und Ionenfallen.

Montag, 29. Jänner 2024, 16.00 Uhr
Festsaal der JKU (Uni-Center, 1. Stock)

Quantum Science and Technology with Solid-State Emitters

Emitters of single quanta of light, i.e, single photons, play an important role for the controlled generation of quantum states. To make use of their unique properties, the physics of these emitters needs to be understood and techniques to integrate them in optical circuits need to be developed. Integrating the emitter of single photons into quantum optical chips is a challenging task. While atoms and ions are very hard to integrate due to their volatile nature, solid-state emitters can be accurately placed at desired positions. Here, we will present different ways to performs such an integration process as well as the applications of integrated nano-sized single photon emitters for sensing applications.
We will show our ongoing efforts to implement a quantum photonic platform using the so called hybrid approach for the assembly of quantum photonic elements. In the hybrid assembly approach, structures and emitters from different materials are combined in order to exploit the specific strength of the individual material while avoiding possible disadvantages by use of complementary other materials. This approach is highly flexible and can be adapted to many different material systems and structures. In particular, we will introduce techniques based on scanning probe microscopy and three-dimensional laser writing. The hybrid quantum photonic elements assembled with these approaches include emitter coupled to on-chip resonators and waveguides, different kinds of fiber integrated cavities and incorporate a variety of emitter such as NV centers, quantum dots, and defects in two-dimensional materials such as hexagonal boron nitride. We will further show our results on understanding the photophysical properties of solid-state quantum emitters and analyze their suitability for hybrid integration.